

**IN THE CLAIMS:**

1 - 4. (Cancelled)

5. (Currently Amended) Heart control apparatus, comprising:

a circuitry for generating a non-excitatory stimulus, configured to generate at least two different stimuli; and

~~a sensor which measures a physiological activity;~~

~~a memory which stores a desired activation profile of a non-arrhythmic heart;~~

~~a controller which estimates a non-arrhythmic current profile based on said physiological activity and determines an electrification pattern according to said non-arrhythmic current profile and said desired activation profile; and~~

a plurality of stimulus application devices for applying to a heart or to a portion thereof said non-excitatory stimulus according to said electrification pattern stimuli;

wherein a first one of said devices delivers  
~~said circuitry for generating a non-excitatory stimulus generates a stimulus which is unable to generate a propagating action potential, configured for applying~~

a first non-excitatory stimulus to a first portion of the heart, using first delivery parameters  
~~said first non-excitatory stimulus having a first effect on the biomechanical behavior of the first portion of the heart, and~~

wherein a second one of said devices delivers a second non-excitatory stimulus to a second portion of the heart using second delivery parameters,  
~~said second stimulus having a second effect on the biomechanical behavior of the second portion of the heart, said first and second effects being different from each other,~~

wherein said first delivery parameters are different from said second delivery parameters and thereby cause different biomechanical effects on tissue to which they are applied.

6 - 9. (Cancelled)

10. (Previously Presented) Heart control apparatus according to claim 5, wherein the first portion of the heart is the left ventricle and the second portion of the heart is the right ventricle.
11. (Previously Presented) Heart control apparatus according to claim 5, configured for modifying the relation between the contraction of the left ventricle and the contraction of the right ventricle.
12. (Previously Presented) Heart control apparatus according to claim 5, configured for simultaneously controlling both ventricles, one control increasing the flow from one ventricle while the other control decreases the flow from the other ventricle.
13. (Previously Presented) Heart control apparatus according to claim 5, configured for simultaneous application of said first and second stimuli.
14. (Previously Presented) Heart control apparatus according to claim 5, configured for controlling the heart for a few beats, every certain period of time.
15. (Previously Presented) Heart control apparatus according to claim 5, wherein said first effect is a modification of contractility without a change in heart rate and without affecting a regular activation of the heart.
16. (Previously Presented) Heart control apparatus according to claim 5, wherein said first effect and said second effect are configured for non-arrhythmic tissue.
17. (Previously Presented) Heart control apparatus according to claim 5, wherein said circuitry is configured for a non-arrhythmic heart.
18. (Previously Presented) Heart control apparatus according to claim 5, wherein said circuitry applies said stimuli in response to a desired increase in cardiac output and not in response to an onset of arrhythmia.

19. (Previously Presented) Heart control apparatus according to claim 5, wherein said first effect is a decrease in contractility.
20. (Previously Presented) Heart control apparatus according to claim 5, wherein said first effect is an increase in contractility.
21. (Previously Presented) Heart control apparatus according to claim 5, wherein said first non-excitatory stimulus is configured to have said first effect on non-arrhythmic tissue.
22. (Cancelled).
23. (Previously Presented) Heart control apparatus according to claim 5, wherein said first non-excitatory stimulus and said second stimulus include only non-excitatory stimuli.
24. (Cancelled).
25. (previously presented) Heart control apparatus according to claim 5, wherein said first non-excitatory stimulus is applied only if said circuitry detects that said heart is not in an abnormal activation.
26. (Cancelled).
27. (Cancelled).
28. (Currently Amended) Heart control apparatus according to claim 5, wherein said apparatus is configured to control desired activation profile ~~define a~~ synchronization of the contractions of the left and right left ventricles.
29. (New) Heart control apparatus, comprising:  
a circuitry for generating a non-excitatory stimulus;

a sensor which measures a physiological activity; and

stimulus application devices for applying to a heart or to a portion thereof said non-excitatory stimulus according to an electrification pattern which results in a desired activation profile;

wherein said circuitry for generating a non-excitatory stimulus generates a stimulus which is unable to generate a propagating action potential, configured for applying

a first non-excitatory stimulus to a first portion of the heart, said first non-excitatory stimulus having a first effect on the biomechanical behavior of the first portion of the heart, and

a second stimulus to a second portion of the heart, said second stimulus having a second effect on the biomechanical behavior of the second portion of the heart, said first and second effects being different from each other,

wherein said desired activation profile defines a synchronization of the contractions of the left and right left ventricles.

30. (New) Heart control apparatus according to claim 5, wherein said circuitry is also configured to separately pace two chambers of the heart.

31. (New) Heart control apparatus according to claim 5, wherein said circuitry is also configured to provide an excitatory stimulus to at least one of said delivery devices.

32. (New) Heart control apparatus according to claim 5, wherein said circuitry is configured to generates said two stimuli within a same heart beat.

33. (New) Heart control apparatus according to claim 5, wherein said devices share at least one electrode.

34. (New) Heart control apparatus according to claim 5, comprising at least one sensor and wherein said circuitry is configured to modify said applying in response to an input from the sensor.

35. (New) Heart control apparatus according to claim 5, wherein said apparatus is implantable and wherein said circuitry is configured to provide said applying or at least 100 out of 5000 consecutive heartbeats.

36. (New) Heart control apparatus according to claim 5, wherein said first delivery parameters are selected so that a direct effect of said first stimulus on cardiac tissue to which it is applied includes an increase in cellular level contractility.

37. (New) Heart control apparatus according to claim 5, wherein said first delivery parameters and said second delivery parameters are different in a duration of stimulus application.

38. (New) Heart control apparatus according to claim 5, wherein said first delivery parameters and said second delivery parameters are different in a timing of stimulus application.

39. (New) Heart control apparatus according to claim 5, wherein said first delivery parameters and said second delivery parameters are different in an amplitude of stimulus application.

40. (New) Heart control apparatus according to claim 5, wherein said first delivery parameters and said second delivery parameters are different in a waveform or sequence of stimulus application.

41. (New) Heart control apparatus configured for synchronizing between the contraction of two ventricles, comprising circuitry for generating a non-excitatory stimulus and an excitatory stimulus, and stimulus application devices for applying to a heart or to a portion said non-excitatory stimuli, wherein said circuitry for generating is configured for applying a first stimulus to a first portion of the heart, said first stimulus having a first effect on the biomechanical behavior of the first portion of the heart, and a second, different, stimulus to a second portion of the heart, said second stimulus having a second, different, effect on the

biomechanical behavior of the second portion of the heart, wherein said first effect is an increase in contractility of tissue to which said stimulus is applied, directly caused by interaction of said stimulus with said tissue.

42. (New) Heart control apparatus according to claim 41, configured for multi-chamber pacing for at least 100 out of 5000 consecutive beats.